"INNOVATIVE LIVER RETRACTION TECHNIQUE: THE PENROSE BARBED-SUTURE INTERNAL RETRACTOR IN MINIMALLY INVASIVE SURGERY"

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The Penrose Barbed-Suture Internal Liver Retractor has been designed to offer surgeons a specialized tool for liver retraction, enhancing visibility during minimally invasive procedures such as laparoscopic and robotic surgeries. Notably, this device facilitates liver retraction without the requirement for an external retractor, ensuring a safe and swift retraction process without the use of trocars or the need for needle extraction through the abdominal wall. Importantly, it does not interfere with robotic arms.

Crafted as a simple and rapid homemade solution, the device is assembled on the back table using a 5 cm latex-free Penrose with a barbed suture attached to each side. One, measuring 10 cm, is for attachment to the falciform above the liver, while the other, measuring 20 cm, is initially attached to the right cross and later to the free edge of the falciform ligament. The barbed suture, a number one PDS suture with a CT-1 needle, is lightly sky for ease of trocar insertion and extraction.

During the procedure, the device is introduced under direct visualization. The 20 cm barbed suture is placed in the right cross, pulled until the Penrose's first edge is attached, and the needle is left in place. The second barbed suture extends the Penrose against the free liver edge, attaching it to the falciform near the diaphragm. The needle is then cut for later extraction. Subsequently, the longer barbed suture is attached to the free edge of the falciform ligament for additional liver retraction in a "V" configuration, followed by cutting and extracting both needles.

A retrospective review of multiple robotic cases performed by a single surgeon from 01/01/2019 to 12/05/2023, totaling 529 cases across eight different procedures, demonstrates the successful use of the Penrose Barbed-Suture Internal Liver Retractor.

Procedures	Number of Cases
Sleeve Gastrectomy	327
Gastric Bypass (Roux-en-Y)	98
Bariatric Revision	44
Hiatal Hernia – Paraesophageal	23
Hiatal Hernia – Sliding	22
Gastrectomy – Distal	5
Gastrectomy – Total	5
Gastrectomy – Proximal	1
Total	**529**

Complications	Number of cases
Major intra-abdominal complications	0
Mild Falciform bleeding	2 (0.37 %)
Conversion to the external liver retractor	0

Noteworthy outcomes include zero major intra-abdominal complications, only two minor intra-abdominal complications (0.37 %), which were mild and easily manageable falciform bleeding, and zero conversions to external liver retractors. The average placement time was 140 seconds.

This innovative tool has proven effective in enhancing operational efficiency and patient outcomes, especially in bariatric procedures. Notably, it reduces pain and risks associated with trocar use in the subxiphoid area for external liver retractors, contributing to cost savings and decreased operative time.

